Spring 2022 EE214 Experiment 2
Miscellaneous Op-Amp Circuits

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Contents

1 Introduction

In this experiment, miscellaneous op-amp circuits, three different setups of op-amp circuity are investigated. First, an independent current source circuit is set and its behavior is required to be characterized. Then the clipper circuit is constructed, and the output is needed to be observed. Lastly, a negative resistance converter with two zener is built with two different setups. First, its i-v characteristics are expected to be observed, then a square wave generator is expected to be set.

2 Experimental Results and Discussion

The results of the experiment are discussed in the following steps.

2.1 Step 1

In this step independent current source circuit given in Figure 1 is constructed. A potentiometer with 10KΩ is connected to the one port as R_L.

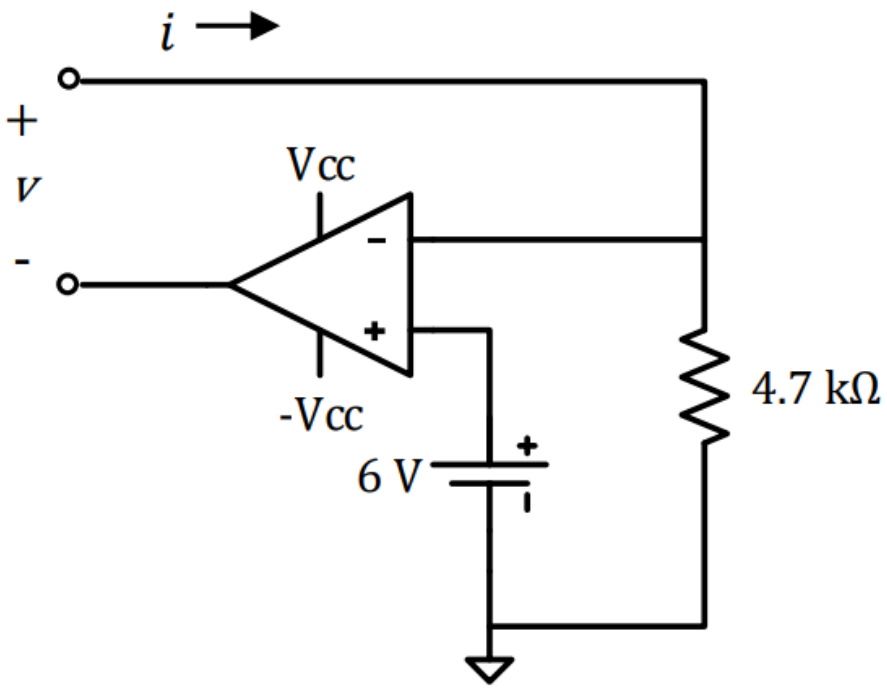

Figure 1: Circuit schematic for the step 1

To be able to obtain the maximum value of the resistance in which the one port still functions as a independent current source, the potentiometer is meticulously adjusted. So , the parameters given in Figure 1 is obtained.

Table 1: Resistance reading by color code convention.

The Current Value	Corresponding Resistance
1.24 mA	8kΩ

2.2 Step 2

In this step the

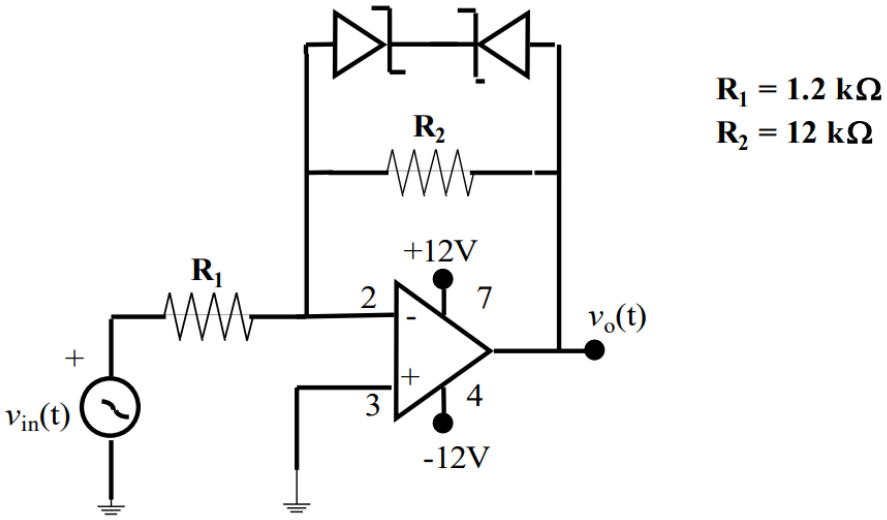

Figure 2: Circuit schematic for the step 2

2.3 Step 3

In this part we set the negative resistance converter circuit given in the figure X below.

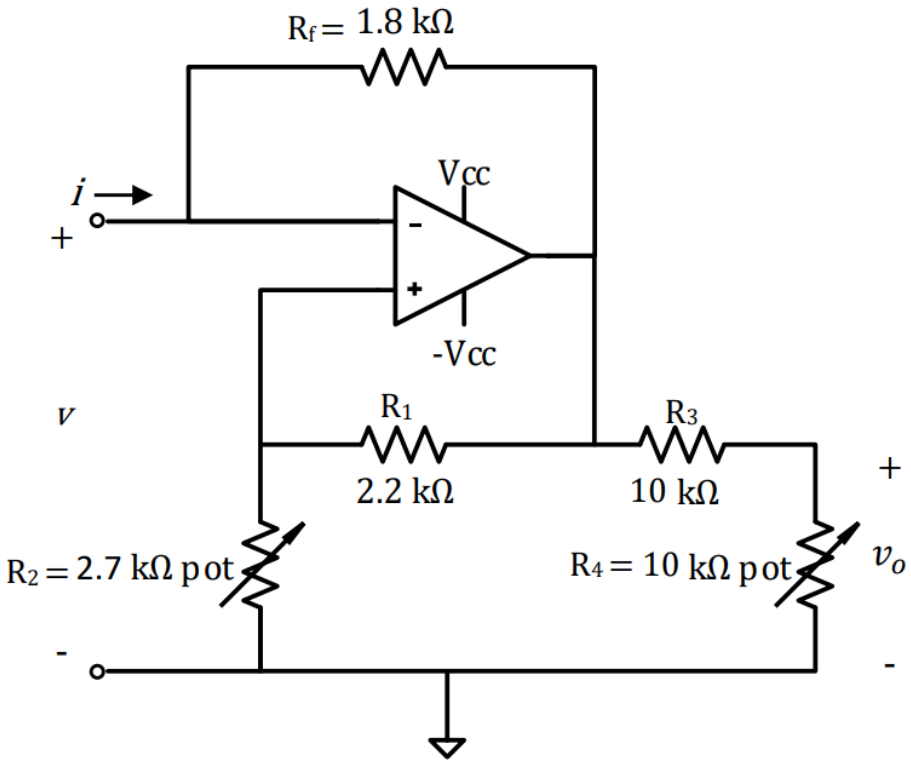

Figure 3: Circuit schematic for the step 3

2.3.1 a)

For this part a, we used 1.2kΩ instead of the R_2 2.7kΩ pot and adjusted the V as $V(t) = 10sin(\pi t)V$ and obtained the i vs v characteristics by using DSO in X-Y mode. To obtain current i, we connceted 1kΩ resistor between common ground and non-inverting input port of the op-amp and measured the voltage accross it, by doing this, we get the current in mA. Also voltage v is obtained by measuring the input signal. From oscilloscope it can be seen that op-amp goes into + saturation or - saturation without being into linear region and circuit is unstable.

2.3.2 b)

In this subsection b. a $1\mu F$ capacitor is connected accross the terminals between this one port circuit and R_2 and R_4 are adjusted untill $V_0(t)$ become a square wave of 2 volts peak-to-peak with frequency of 500Hz. Then, R_2 and R_4 are recorded as table which is given in the figure X. It can be observed that experimental values are consistent with the preliminary work results given in figure X.

Table 2: Resistance reading by color code convention.

R_2	R_4	τ
0.46kΩ	2.4kΩ	1.8x10⁻6s

3 Conclusion

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Appendix A

- PreLab Preparation 4 hours
- Experimental Work 2 hours
- Report Writing 4 hours